VARIETY RESPONSE TO CUTTING SCHEDULES IN IMPERIAL VALLEY

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High alfalfa hay yields are hard to come by in the Imperial Valley with its heavy soil, hot temperatures, root diseases and high salinity. Under the conditions mentioned above, this trial was conducted to determine the best possible cutting frequency for CUF 101, Moapa 69, WL 512 and five other varieties. The other varieties being of greater dormancy. The main object was to determine the best possible cutting practice to get maximum hay yields. The cutting schedules were three, four, five and six weeks. This means there were 17 cuttings per year for the first treatment of three weeks. The four week schedule had 13 cuttings per year, the five week schedule had ten and the six week treatment was cut 8.7 times per year.

This trial was located at the University of California Field Station (Meloland). It was planted October 22 and 23, 1978. It was sprinkle irrigated on October 23, 24, 26 and 27. There were eight varieties, cut four times with five replications which equaled 160 plots. The main plots were cutting schedule while the varieties were subplots. The analysis of variance used was randomized complete block design. Two hundred pounds per acre of P_2O_5 were applied preplant and disced into the soil;after that,yearly applications of one hundred pounds per acre of P_2O_5 were applied. 2,4-DB and IPC were both applied at maximum label strength at the beginning of stand establishment. Insecticides were applied as necessary to control aphids and worms. Blue, pea and spotted aphids were present. Armyworms, alfalfa caterpillar and Egyptian alfalfa weevil caused problems and were sprayed when necessary. Irrigation in the summer time was normally every week to every other week. Cuttings were started April 17, 1979 and ended on December 31, 1981. The trial was terminated in 1982 due to heavy damage from Rhizoctonia, Phytophthora and scald.

Results. All the three years data is summarized in Table 1. Taking CUF 101 as an example for the 21 day cutting schedule of 1979, the average was 4.75 tons per acre from Apr 17, 1979 to December 31, 1979. Likewise, for the same cutting schedule the second year (1980), produced 5.24 average tons per acre. This is for the period of January 1980 to December 31, 1980. The third year was again a calendar year (1981) with 3.80 tons per acre, etc.

Table 1 shows the overall mean for the three years times the four cutting schedules times the five replications for each variety. CUF 101 was on top with 6.35 tons per acre average yield. This was .27 tons greater than Moapa 69, but not statistically significant from it at the five percent level of probability. However, CUF 101 was significantly different from all other six varieties in the trial as shown by the letter a. UND variety means undetermined.

Figure 1 shows three years data and harvest interval for the variety CUF 101. In 1979 as the alfalfa plants begin to grow, the 21 day cutting schedule has the lowest yield as would be expected. The yields increase as you go to 28 days and similarly to 35 and 42 days. In 1980 the highest yield year for 21 day cutting schedule of 5.24 tons per acre shows the plants being at their most vigorous. During the same year, the 28 and 35 day cutting schedule both almost hit 8 tons per acre. The 42 day cutting schedule hit over 8 and 1/2 tons per acre. In 1981 the 21 day cutting schedule dropped below 4 tons per acre due to reduced plant vigor. The 28 day cutting schedule was also below the previous two years while the 35 and 42 day cutting schedule shot up over 1979 and 1980 respectively.

Figure 2 shows clearly the 21 day cutting schedule on the bottom for all three years for the variety CUF 101. In fact, the last year of the trial (1981) shows sharp declines for both 21 and 28 day cutting schedules. In both 1979 and 1981, (left and right side of figure) each increase in number of days gave an increase in yield.

Figure 3 shows total CUF 101 yield for the three years of the trial in which just under 24 tons per acre was produced with the 42 day cutting schedule. The total yield for three years of production on the 21 day cutting schedule was just under 14 tons per acre or a difference of about 10 tons per acre less for the three year period.

Figure 4 shows total three year yield for Moapa 69. There was over 22 tons per acre produced by the 42 day cutting schedule which is not as great as CUF 101 for the same treatment. In general, Moapa 69 was not as good as CUF 101 for the other cutting schedules of 35, 28 and 21 days.

Figure 5 shows total yield for Lahontan variety which was the lowest yielder of the eight varieties, but not significantly different than Dawson as shown in Table 1. Figure 5's highest yield is shown at below 21 tons per acre for cutting schedule of 42 days. Comparing this schedule with CUF 101 or Moapa 69, there is not a great deal of difference in total yield. This figure is included so the reader can compare these lowest yields with the highest yielding CUF 101.

Table 2 shows a three year yield summary of the four harvest intervals. Average yields are given for the eight varieties and all of their cuttings for each year. The overall mean for this table shows no significant difference between 42 and 35 days. The 28 day schedule is significantly different from all other treatments as is the 21 day schedule.

Table 3 shows weed ratings taken the second year of the trial. The overall average for this table gives CUF 101 the top position (with low weed populations), however, it is not significantly different from the next three varieties. The highest weed population was found to be the 21 day cutting schedule which is significantly different than all other frequencies.

Table 4 shows root and crown dry weights for the eight varieties and four harvest intervals after three production years. The roots plus crowns showed CUF 101 not significantly different from Pioneer Brand 581, Moapa 69, and WL 512. However, CUF 101 was significantly different from all other varieties.

Summary and Conclusion. The total seasonal production of alfalfa, its quality produced, the ability of a stand to persist over a number of years, its vigor and subsequent ability to resist invasion of weeds are all affected by the frequency with which alfalfa is harvested. This data provides reliable information that producers can use to predict the overall effect of imposed harvest frequencies on their stands as it relates to production, quality and stand persistence. Factors which influence hay quality are stage of maturity, leafiness, foreign material (weeds and dirt), condition of hay (moldy dustiness, dryness) and green color. In other areas there doesn't seem to be a justification for cutting alfalfa later than the 10 percent bloom stage, this is according to test in those locations.

Harvesting the Variety CUF 101 on a 42 day schedule produced 14 percent more yield than a 35 day schedule, 31 percent more than the 28 day schedule and 72 percent more than the 21 day schedule. CUF 101 yield was reduced in the 21, 28 and 35 day schedule, but not reduced in the 42 day schedule for the third year of production. It is important to point out that each variety would probably have its own best cutting schedule for maximum yield. (That is, each would be cut at different dates.) Stands declined drastically for all eight varieties in the 21 day cutting schedule during the third year of production.

Weediness is also related to harvest frequency and varieties. The shorter the cutting schedule usually the greater the weed population. As both stands and vigor are reduced, weeds increase.

All this data seems to indicate that a grower can produce just about any quality alfalfa that a dairyman may want. However, in some cases the dairyman may not be willing to pay the added cost of production.

Table 1. Three individual years yield summary of four harvest intervals and eight varieties of different dormancy. Imperial Valley Field Station, Imperial County. 1979, 1980, 1981.

Variety	21 days				28 days				35 days				42 days				Overall Mean	
	1979	1980	1981	Mean	1979	1980	1981	Mean	1979	1980	1981	Mean	1979	1980	1981	Mean		
CUF 101	4.75	5.24	3.80	4.59	5.63	7.88	4.67	6.06	5.99	7.79	6.85	6.88	6.27	8.57	8.83	7.89	6.35	a
Moapa 69	4.70	4.45	4.14	4.43	4.98	6.96	4.87	5.61	5.39	9.57	5.39	6.79	5.38	9.18	8.03	7.53	6.08	ab
UND	4.26	4.44	4.47	4.39	4.47	7.25	4.92	5.55	5.60	9.65	5.89	7.05	5.26	8.70	7.79	7.25	6.05	b
WL 512	4.69	4.01	4.35	4.18	5.22	6.53	4.53	5.43	6.30	7.87	6.80	6.99	6.05	8.80	7.95	7.60	6.05	b
581	4.17	5.10	3.76	4.34	4.84	6.20	4.61	5.22	5.90	7.91	5.98	6.60	6.31	7.45	9.09	7.62	5.94	bc
WL 318	3.82	4.47	3.98	4.09	3.78	7.49	4.34	5.21	5.12	9.94	5.45	6.84	4.91	8.87	6.47	6.75	5.72	
Dawson	2.85	5.28	3.10	3.74	3.58	6.97	4.61	5.05	4.34	9.03	5.22	6.20	4.91	8.10	6.05	6.35	5.33	d
Lahontan	3.34	3.91	3.35	3.54	4.05	6.11	4.72	4.90	4.92	7.27	5.53	5.90	5.78	7.14	7.52	6.82	5.30	d
Interval/ Year Mean	4.07	4.61	3.80		4.57	6.93	4.66		5.45	8.63	5.89		5.61	8.35	7.72			
Harvest Interval Mean		4.16				5.39				6.66				7.72				

LSD's	.05	.01
Between harvest interval	0.75	1.04
Between varieties	0.28	0.37
Between varieties for different or same harvest interval	ns	ns
Between years for same or different harvest interval	0.37	0.48
Between years for same or different varieties	0.52	0.68
Between years, varieties, and harvest interval	1.04	1.37

Table 2. Three-year yield summary of four harvest intervals. Average of eight varieties of different dormancy. Imperial Valley Field Station, Imperial County. 1979-81.

Days between harvest	Year 1979	1980	1981	Total	Mean
42	5.60	8.35	7.72	21.67	7.72 a
35	5.44	8.63	5.89	19.96	6.66 a
28	4.56	6.92	4.66	16.14	5.39 b
21	4.07	4.61	3.80	12.48	4.16 c
Mean	4.97 c	7.13 a	5.52 b		

LSD's	.05	.01
Between harvest interval	0.75	1.04
Between years	0.18	0.24
Between years for same and different harvest interval	0.36	0.48
Between years for different harvest interval	ns	ns

Table 3. Weed Rating After 2 Years of 8 Varieties and 4 Harvest Frequencies at Imperial Valley Field Station, February 24, 1981.

Weed Rating*

Variety	Harvest frequency 21	28	35	42	Average
1. CUF 101	2.6	1.3	1.6	1.5	1.75 a
2. UND	2.7	1.7	1.9	1.8	2.03 abc
3. Moapa 69	2.8	1.3	1.8	1.6	1.88 ab
4. WL 512	3.6	1.3	2.3	1.6	2.10 abc
5. 581	3.5	1.5	2.0	2.0	2.25 bc
6. Lahontan	3.2	1.8	2.1	2.2	2.33 c
7. WL 318	4.6	2.1	3.0	3.3	3.25 d
8. Dawson	4.7	2.9	2.9	3.4	3.48 d
Average	3.41	1.73	2.20	2.18	

LSD:	.05	.01
1. Between harvest frequencies:	0.55	0.76
Between varieties:	0.40	0.53
3. Between varieties for same harvest frequency:	ns	ns
4. Between same or different varieties for different harvest frequencies:	ns	ns

*1 = no weeds
2 = trace
3 = light
4 = moderate
9 = completly covered with weeds

Table 4. Root and crown dry weight[1] for eight varieties of different dormancy after three production years.[2] Four harvest interval, eight variety trial. Imperial Valley Field Station, Holtville, Imperial County. 1982.

Variety	Weight in Grams			Dormancy[3]
	Root	Crown	Root plus crown	
Pioneer Brand 581	18.45 a	13.80 a	32.25 a[4]	ID
Moapa 69	19.10 a	13.00 a	32.10 a	ND
CUF 101	19.95 a	11.25 ab	31.20 a	VND
WL 512	18.05 a	10.00 ab	28.05 ab	ND
Lahontan	14.40 b	9.85 ab	24.25 bc	SD
UND	11.55 bc	8.70 b	20.25 c	SD
Dawson	11.00 bc	10.20 ab	21.20 c	D
WL 318	10.30 c	8.10 b	18.40 c	SD
Mean	17.54	12.12	25.96	
% CV	35.1	52.6	39.5	
LSD (.05)	3.37	3.50	6.42	
(.01)	4.46	4.63	8.50	

1
Sampled April 20, 1982, washed, separated into 4" root sections and crowns with stems cut back to the crown and dried. All values at 100% dry matter. Weights represent 5 roots and crowns.

2
Planted October 23, 1978 at 25 pounds per acre with five replications. Imperial clay soil.

3
D = winter dormant; SD = semi winter dormant; ID = intermediate dormant; ND = non winter dormant; VND = very non dormant.

4
Entries followed by the same letter are not significantly different from each other at odds of 19 to 1.

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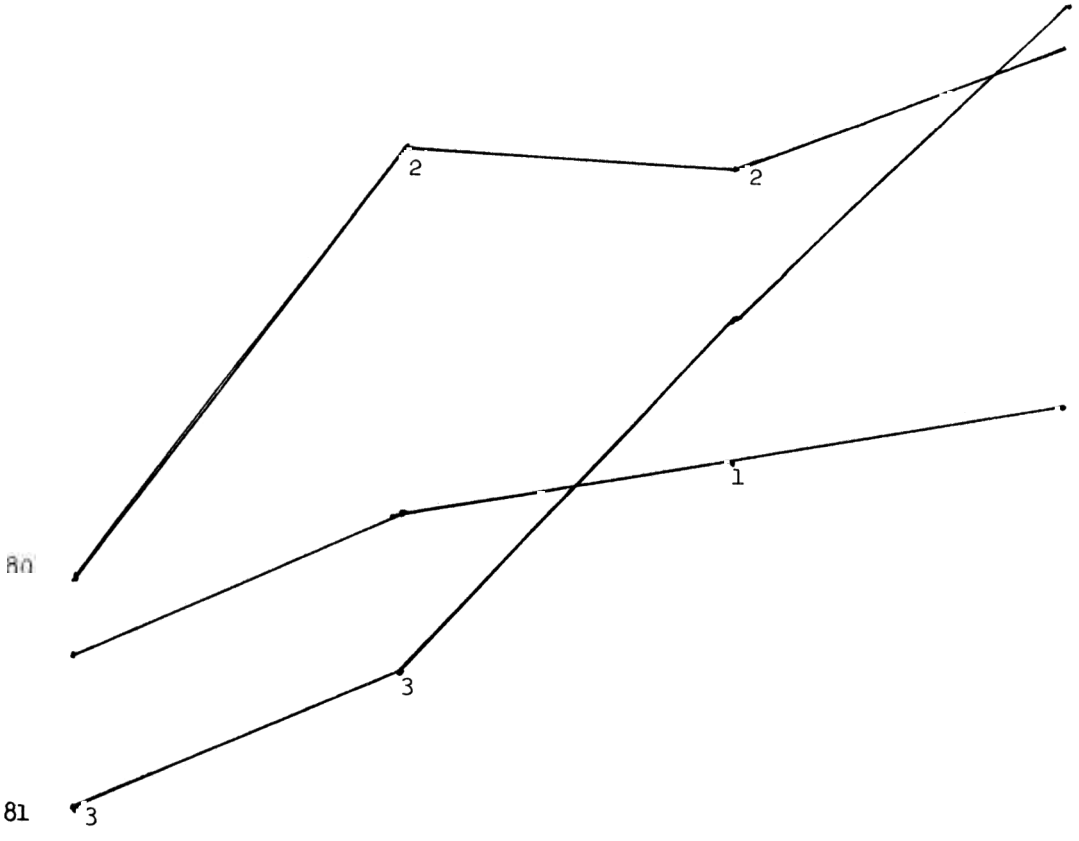


in Tons/Ac

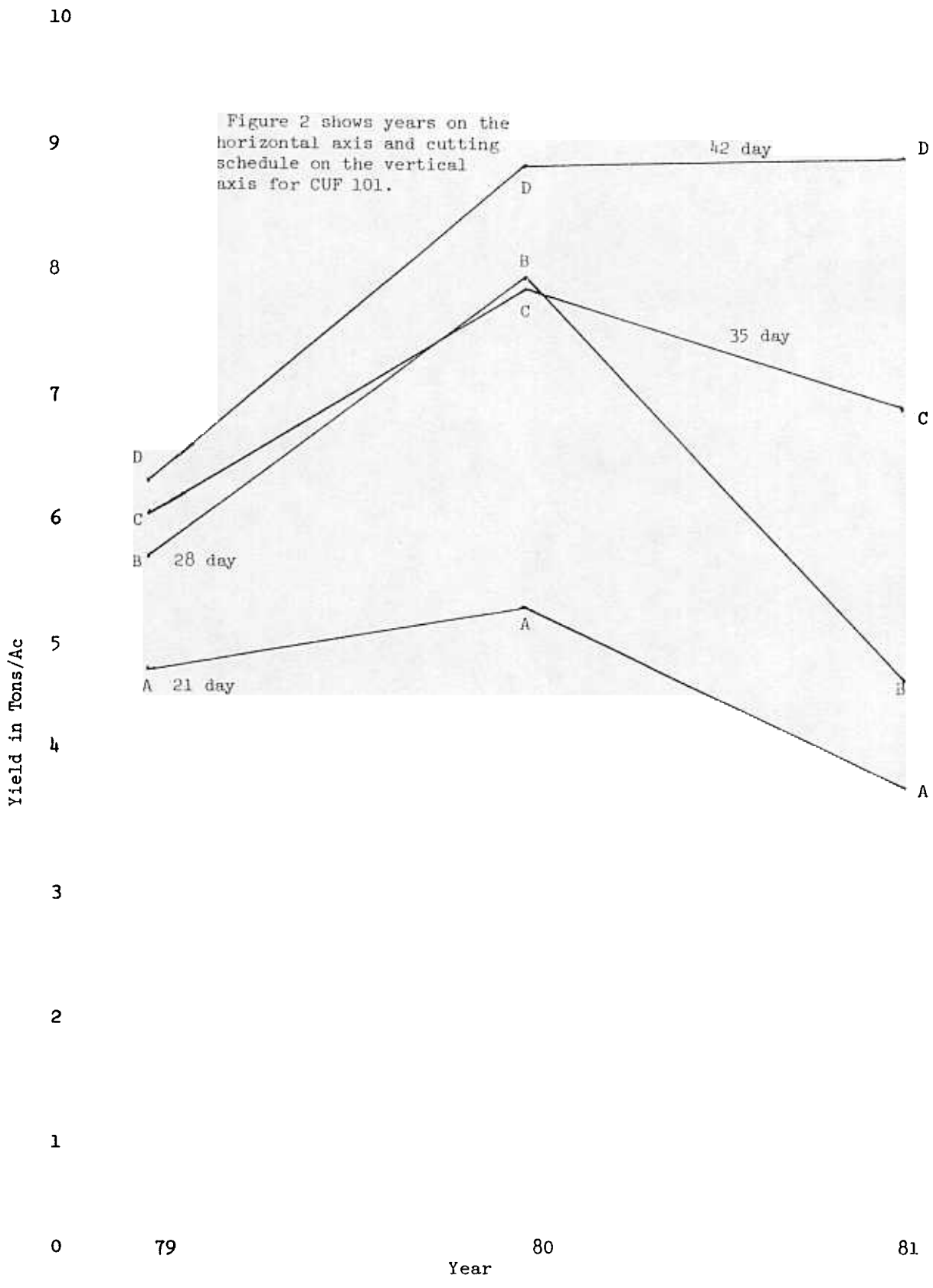
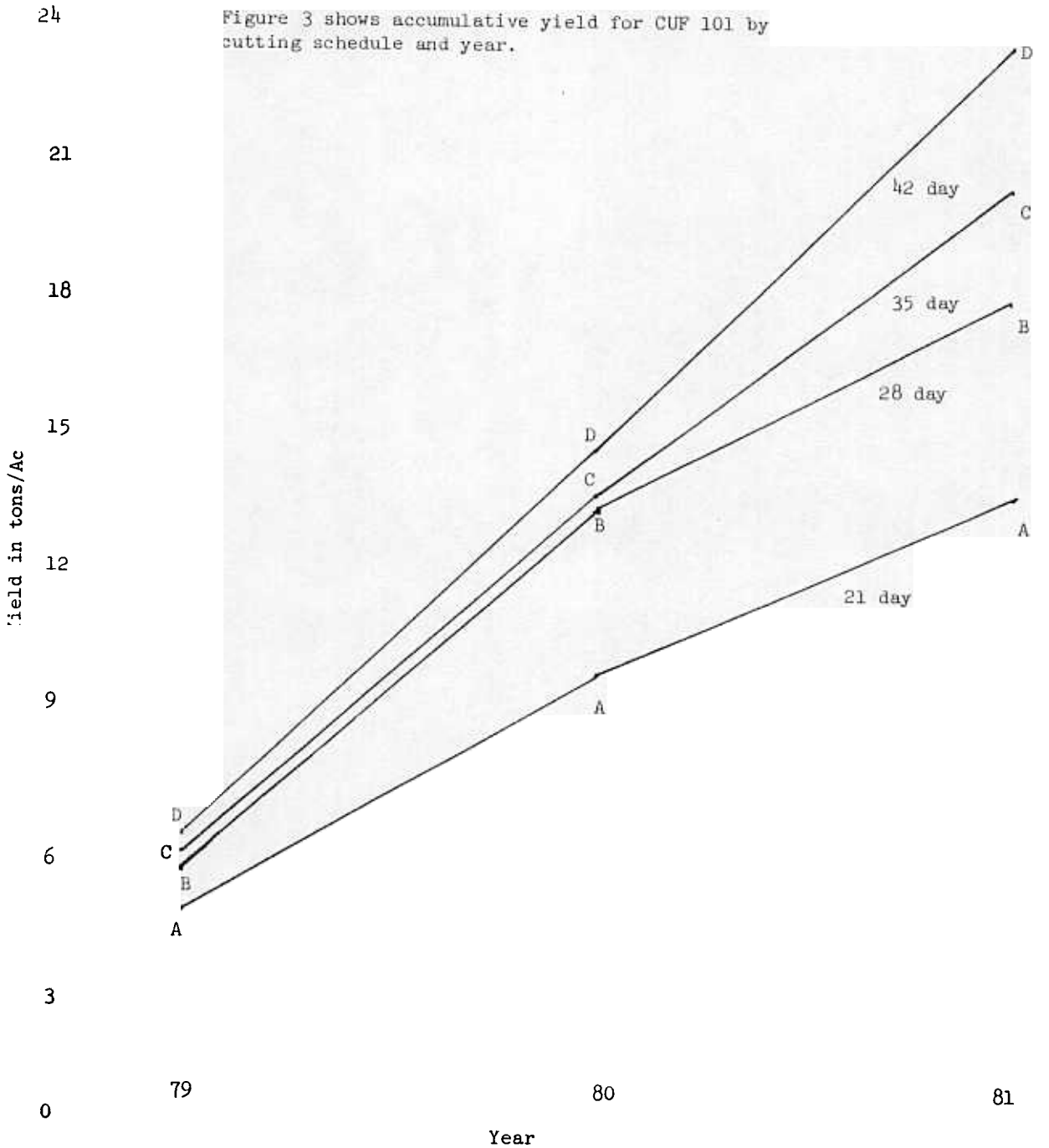


Figure 2 shows years on the horizontal axis and cutting schedule on the vertical axis for CUF 101.
42 day
35 day
28 day
21 day
D
C
B
A
Yield in Tons/Ac
10
9
8
7
6
5
4
3
2
1
0
79
80
81
Year

Figure 3 shows accumulative yield for CUF 101 by cutting schedule and year.



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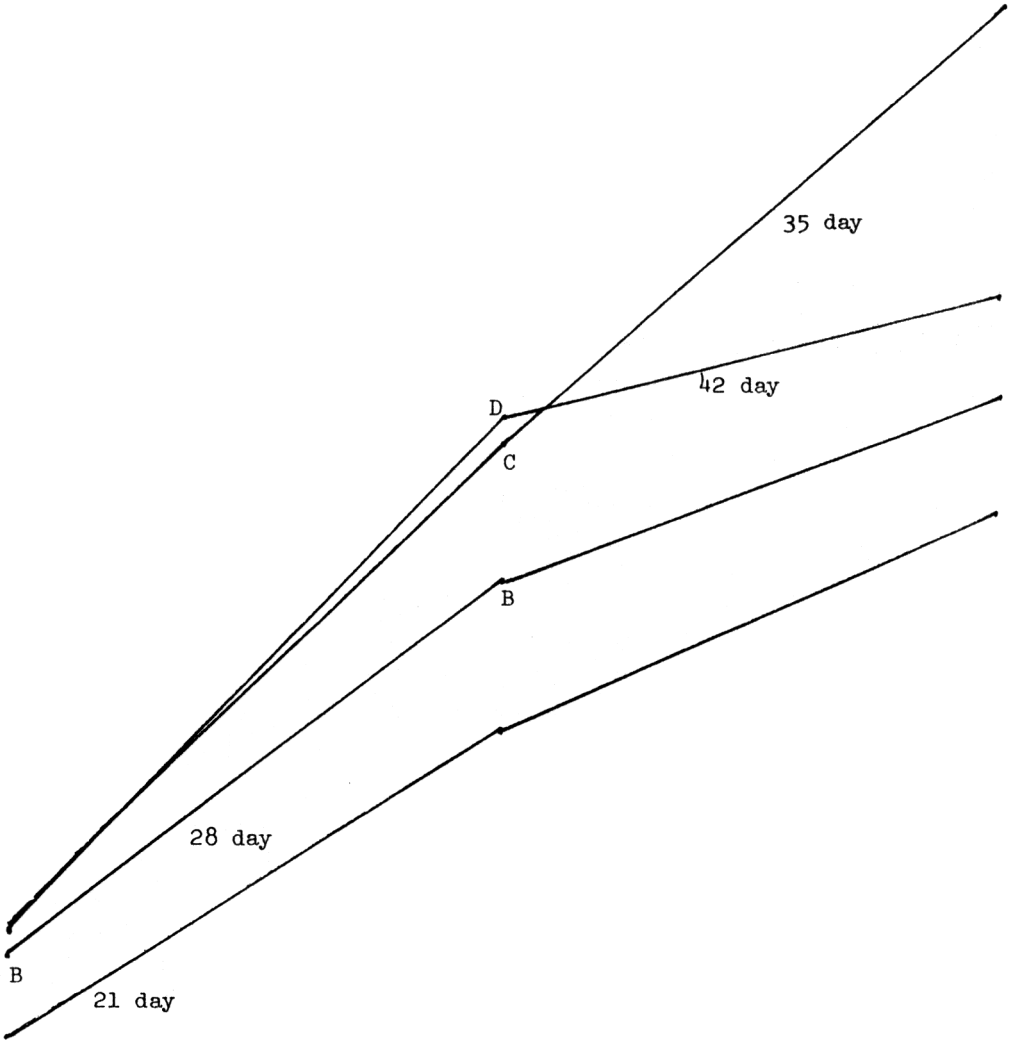

Yield in Tons/Ac

81

ar

30

24

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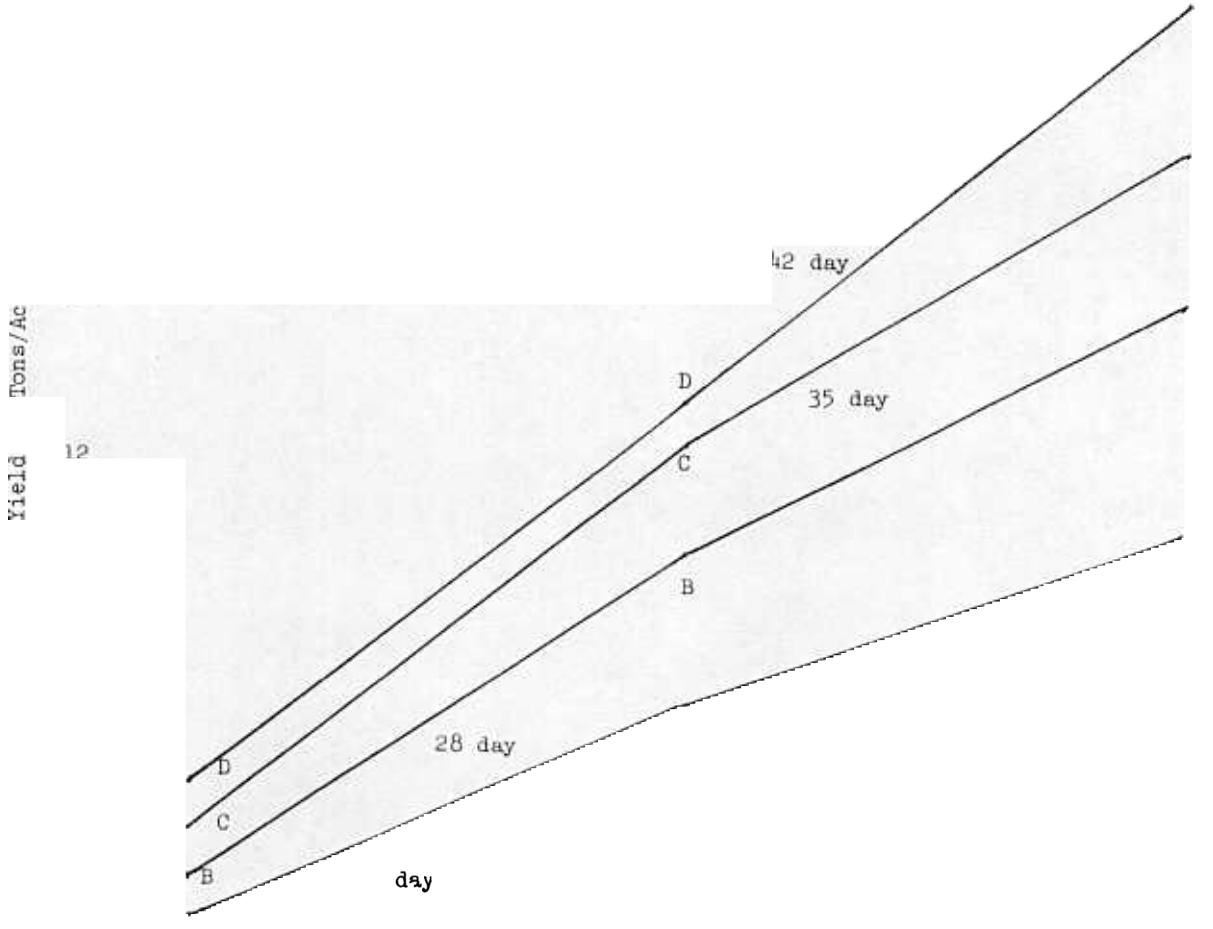

80

ar